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NOTES ON *STROMBUS DENTATUS* LINNÉ AND THE *STROMBUS URCEUS* COMPLEX

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A remark made by Tryon in his monograph on the Strombidae (1885, p. 118) in discussing *Strombus dentatus* Linné has prompted me to examine the taxonomic history of the species in the so-called *dentatus* group. Tryon there said: "The difference between this species and *S. urceus* is so slight, and there is so much variation in the shells, that it is very doubtful whether their separation can be maintained."

A reading of the meager references to this group, a study of the synonyms involved, and an examination of a considerable series of specimens disclose an obvious confusion which appeared as early as Gmelin and has persisted in the minds of all but a few authors since his day. I have concluded that:

1. *Dentatus* Linné is not identical with *urceus* Linné or with any form of the *urceus* of authors, and Tryon's remark is true only if we assume that he was speaking of the shells which are today almost universally known as *dentatus* and *urceus* Linné in our collections. It is not true if he meant the *dentatus* and *urceus* described by Linnaeus.

2. *Dentatus* as described in the "Systema naturae" is identical with the shell described by Gmelin in 1791 and Lamarck in 1822 as *tridentatus*, by Chemnitz in 1777 as *dentatus*, and by Reeve in 1851 as *samarensis*. The other names mentioned should therefore be thrown into the synonymy of *dentatus* Linné and that shell disassociated from any form of *urceus* Linné.

3. *Urceus* Linné is tentatively to be listed as unidentifiable. The various forms of the complex known as the *urceus* of authors seem to be one species for which the earliest valid name is *Strombus ustu-*

latus Schumacher, 1817. This complex presents such extremes of form, however, that further study may justify its separation into subspecies or even species.

1

On the first point we should turn immediately to the Linnaean descriptions:

Strombus urceus LINNAEUS, 1758, p. 745, No. 440; 1767, p. 1212, No. 512.

"S. testae [sic] labro attenuato retuso brevi striato, ventre spiraque plicato-nodosis, apertura bilabiata inermi."

TRANSLATION: Shells with a "thinned-out," reflected, short, and ridged lip, body-whorl and spire plicate-nodose, aperture bilabiate and lacking armature.

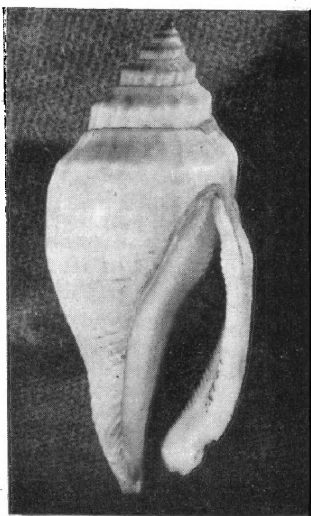
Strombus dentatus LINNAEUS, 1758, p. 745, No. "o"; 1767, p. 1213, No. 513.

"S. testa labro attenuato brevi dentato, ventre spiraque plicatis."

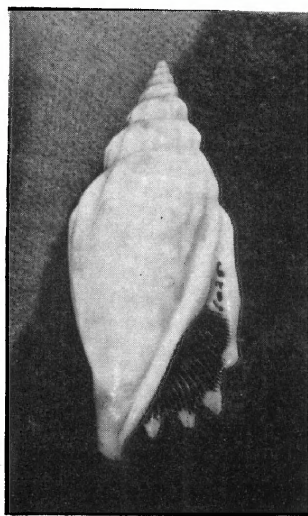
TRANSLATION: Shell with a "thinned-out," short and toothed lip, body-whorl and spire plicate.

The figures shown in the synonymy of Linné's *urceus* all show approximations to the more or less strongly plicated form of the *urceus* of authors, although it is to be noted that this is not the form usually labeled *urceus* in our collections, which is in most cases the larger, more graceful, and less plicate shell. It is unfortunate that Linnaeus did not supply a synonymy for *dentatus* in either the tenth or twelfth edition of the "Systema." Had he done so the question of its identity might never have arisen.

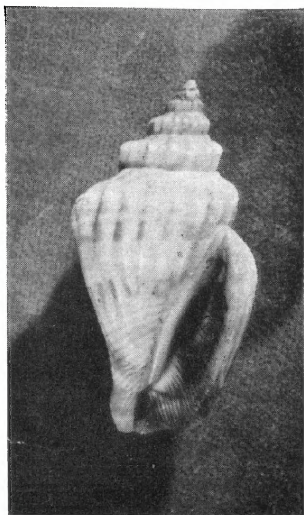
It is obvious that the confusion in the identity of *dentatus* and its fancied relation to *urceus* have arisen from a careless reading of the Latin description. But the conclusion seems inescapable that Linnaeus was describing two entirely different shells. The reflection of the lip and the presence of nodes in *urceus* are not indicated in the



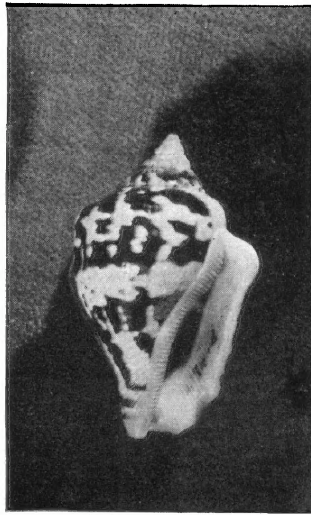
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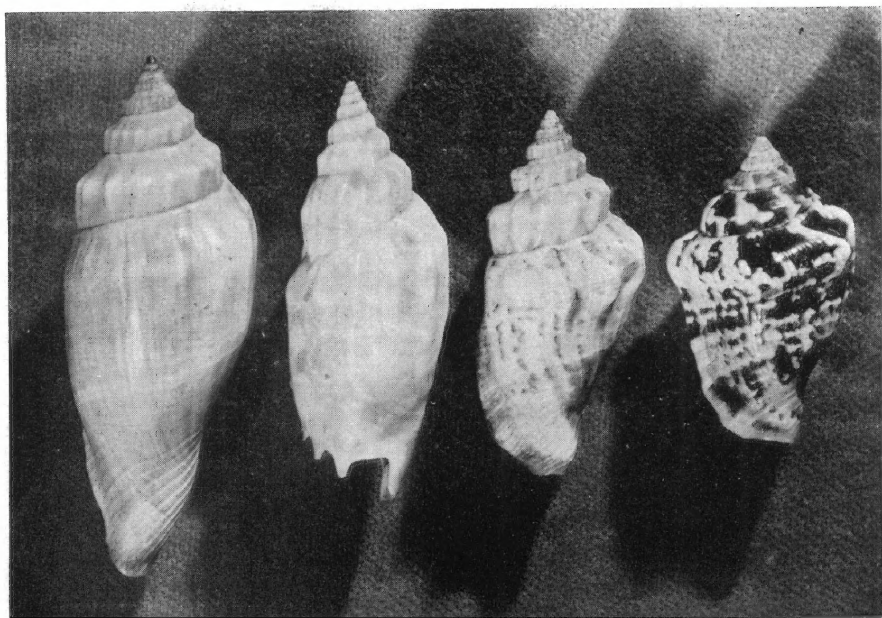
Fig. 1. *Strombus ustulatus* Schumacher, form *laevis*, new name. (*S. urceus* of most authors, *non* Linné.) No locality data. A.M.N.H. No. 12927.

Fig. 2. *Strombus dentatus* Linné (*S. tridentatus* Gmelin). Philippine Islands.

Fig. 3. *Strombus ustulatus* Schumacher, form *plicatus*, new combination. (*S. dentatus* of most authors, *non* Linné.) Catanduanes, Philippine Islands.

Fig. 4. *Strombus floridus* Lamarck (*S. mutabilis* Swainson). "Indian Ocean." A.M.N.H. No. 49418.

Figures 1 and 3 are examples of the extreme forms of *S. ustulatus* from the standpoint of sculpture. All figures $\times 1$. Photographs by Marion A. Bills.



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6

7

8

Back views of shells illustrated in figures 1 to 4.

Fig. 5. *Strombus ustulatus* Schumacher, form *laevis*.

Fig. 6. *Strombus dentatus* Linné.

Fig. 7. *Strombus ustulatus* Schumacher, form *plicatus*.

Fig. 8. *Strombus floridus* Lamarck.

All figures $\times 1$. Photographs by Marion A. Bills.

description of *dentatus*. The aperture of *urceus* is stated to be "inermi," whereas the lip of *dentatus* is "dentato." In the latter species he was describing a shell with a toothed lip. Linnaeus' language can be read in no other way. It is true that in certain other descriptions Linnaeus dignified the striae or furrows of the inner aspect of the lip (which are present in all shells of the group here discussed) with some name derived from the Latin "dens." I have, however, examined the descriptions of every other species of gastropod for which he used "labro dentato" or words of like import, and can report that in no case did he employ such an expression for a shell which did not have true teeth on the edge of the lip or on its inner aspect. As an illustration, compare *Voluta mercatoria* (1758, No. 357)—our *Pyrene mercatoria*—"labroque introrsum gibbo denticulato"—with *Murex fusus* (1758, No. 478)—our *Tibia fusus*—"labro dentato"). In the first case the "teeth" are mere ridges inside

the lip. In the latter they are true teeth on the lip.

There may have been a difference of opinion as to whether the word "brevi" in the description of both *urceus* and *dentatus* is an adjective modifying "labro" or an adverb modifying "dentato." I suggest that a study of the descriptions on page 745 of the tenth edition of the "Systema," which contains two broad-lipped species, *gigas* and *latissimus*, and the several short-lipped species, *epidromis*, *canarium*, *vittatus*, *urceus*, and *dentatus*, should satisfy one that "brevi" is an adjective modifying "labro." It must be admitted that Linnaeus used "brevi" very broadly as applied to the lips of the species mentioned. It is true that they are all short-lipped, but the shortness varies in degree. The true *dentatus* Linné (*tridentatus* Gmelin) has an unusually abbreviated lip, and Linnaeus might well have indicated this by more emphatic phraseology.

Thus *dentatus* possesses a characteristic

which is not present in any of the forms of the *urceus* complex, unless one is willing to use the word "teeth" for the irregularities or crenulations produced by the stromboid notch. These irregularities, which are well shown in the figure from Chenu and Reeve reproduced by Tryon in volume 7 of the "Manual of conchology," are often pronounced, but in no case are there more than two, and these are short, blunt, and rounded and are mere modifications of the crenulations present in most forms of the *urceus* complex. If these features may be called "teeth," then virtually every *Strombus* would have to be described as "dentato."

I have examined a considerable series of specimens labeled *urceus* Linné, *dentatus* Linné, and other names which will be mentioned later, in several private collections and in the collections of two large museums, and in every case those identified as *dentatus* were, within the limits of the variations present in this complex, very close to those identified as *urceus*. I am therefore forced to the conclusion that both the *dentatus* and the *urceus* of authors and of our collections are very closely allied if not conspecific.

The noticeably variable traits are: the length, prominence, and spacing of the axial plications on the body whorl; the degree to which the stromboid notch is developed; the degree and form of the thickening of the lip; the sculpture of the spire and the color pattern. The most important color variation is the presence of a black or purplish black columella or outer lip or both. This color is so striking that many of the early conchologists mention it in describing *urceus*, thus making it a definite characteristic of the species. (Cf. Lamarek, 1822, "labrum caudaque nigricante . . . fauce nigra"; Chemnitz, 1845 edition, where the shell is called "Die Schwartzmündige Flügelschnecke"; Knorr, 1768, who calls it "Die Schwartzmündchen"; and Reeve, 1851, who says, vol. 6, pl. 11, "This species may generally be recognized by the dark purple-black coloring of the columella and aperture, which in some specimens is, however, only partially indicated.") The fact is that the great

majority of specimens labeled *urceus* have a colorless or yellow-orange columella and lip. The black is the exception. The black individuals were mostly of the smoother form in the series examined, although the plicated form showed a few black specimens.

In all these variations I failed to find, between lots of individuals possessing a given group of traits and other lots possessing other groups of traits, any real points of cleavage sufficiently marked to justify the conviction that any form is entitled to specific or subspecific rank. The variations, although presenting very wide extremes, are nevertheless connected by such a complete chain of intermediates that I cannot find any evidence of discontinuity at any point. Nor have I been able to formulate any conclusion as to geographical races upon the stated locality of the series examined. The most extreme forms are found over the entire range of the shells involved, which extended from Mindoro in the Philippines to Australia, the New Hebrides, and the Paumotu, and as far west as the Red Sea and Mauritius. Nor were any of the lots examined sufficiently documented to enable one to determine whether temperature or salinity of water, type of bottom, nature of food, or any other ecological factors could be given any weight. There is, perhaps, room for further useful study along this road.

2

If *dentatus* Linné was not the *dentatus* of our museums, what was it?

Chemnitz (1788, vol. 10, pp. 220-221), in describing *dentatus*, correctly read the Linnaean description calling it "Die Gezähnte Flügelschnecke" and specifically describing its lip as "labro infra dentato." He cited figures from Seba showing a shell with a definitely toothed lip as distinct from a crenulated lip or one with "teeth" consisting of the sides of the stromboid notch. The figures shown in the volume of plates appended to volume 10 of the "Conchylien Cabinet" are the most accurate pictures of the tridentate *Strombus* that have appeared in any iconography with the exception of that of Reeve.

Chemnitz, however, complicated the issue by describing another shell, *S. samar*, new name (1788, vol. 10, p. 221). While *samar* was not described as having a dentate lip, its pictorial synonymy showed a figure which probably represents a young *tridentatus* Gmelin with very rudimentary teeth. Yet the name is in use today, and many specimens of typical *tridentatus* labeled *samar* Chemnitz are found in our collections. I have no idea what Chemnitz was describing in his *samar*. Either the name must be rejected as unrecognizable or be made a synonym of *dentatus* Linné according to the amount of clairvoyance we can exert in reading Chemnitz' description. Sowerby's *Strombus bullatus* has been suggested as being equal to *samar*, but the vagueness both of Chemnitz' figure and of Sowerby's figures of *bullatus* precludes any certain identification.

The mistake which has plagued *dentatus* Linné began with Gmelin. In the thirteenth edition of the "Systema naturae" he listed two shells described as having dentate lips although only one is known: *S. dentatus* and *S. tridentatus* (1791, p. 3519, Nos. 31 and 30, respectively). The description of the first is copied bodily from Linnaeus with a long sub-description which adds nothing in regard to the lip. The description of the second is a good diagnosis of the tridentate *Strombus*, the words "labro triacantho" being much more graphic than the language used by Linnaeus. It is impossible to guess what shell Gmelin thought he was presenting in his *dentatus*. The figures he cited for it are varied. Some clearly show *tridentatus*, and others picture one or another of the forms of the *urceus* of authors. Whether his *lapsus* means that he thought that his *tridentatus* was hitherto undescribed or whether he meant to change the Linnaean specific name to his own and then restore it for a form of *urceus* is only a matter of conjecture.

Lamarck was also in error in his conception of *dentatus* Linné. He describes *tridentatus* (1822, vol. 7, p. 209) very graphically, using the words "basi tridentato," and supplies a partially correct synonymy. He also lists *S. plicatus*, new

name (*op. cit.*, p. 210) of which he says in his French description, "its right border is not dentate but shows at its lower end the characteristic sinus of the genus." He follows this by citing *S. dentatus* Linné as a synonym, thus becoming the first author definitely to identify *dentatus* Linné with a member of the *urceus* complex (*urceus* of authors).

It is not possible within the limits of this paper to discuss the opinion of all the authors who have listed this species. Suffice it to say that Chemnitz and his revisers in the 1845 edition, Sowerby (1847, *Strombus*, p. 31), and Hanley (1855, p. 276) either directly or indirectly properly identified *dentatus* Linné with *tridentatus* Gmelin, thus correctly interpreting the Linnaean description. All the others, notably Gmelin, Lamarck and his revisers, Deshayes and Milne Edwards (1845, vol. 9, p. 706), Reeve (1851, vol. 6, pl. 9, fig. 17), and Tryon (1885, vol. 7, p. 118) have continued the old error of identifying it with some form of the *urceus* of authors.

Hanley was the last writer who properly read the Linnaean description. Since his day I can find no mention or figure of *dentatus* which suggests that it is anything else than a form of the *urceus* of authors of the more plicate type, and the labels in our collections follow this lead. If we base our opinion upon the number of supporters of each theory certainly the evidence is preponderantly in favor of the view presented in this paper. And if we study the figures cited by all the authors through Hanley, and particularly if we go to the final and best source—Linnaeus' own language—we are forced to the conclusion that the *dentatus* in our museums is not the *dentatus* of Linnaeus. The very name given to the latter was a description of it, and, incidentally, it is the only gastropod to which he gave this name. That fact is surely additional evidence.

3

I have already said that I cannot separate out any species or subspecies from among the very variable group called the "*urceus* of authors," in which I include the *dentatus*

of most authors. The larger question is: Just what shell was Linnaeus describing in *urceus*? The following notes suggest that the *urceus* of all authors following Linnaeus was a different shell from that described by him, and that the identity of his *urceus* has not been satisfactorily determined.

For almost a century after Linnaeus I can find no comments in the literature suggesting that the *urceus* of all authors had not been described in the "Systema." The first who raised the question was Hanley. On page 275 of his "Ipsa Linnaei conchyliæ" (1855) he says: "One regrets to disturb a long established identification, yet truth compels me to declare that the *S. urceus* of modern writers is not the true representative of the species thus named by our author. We shall not find among the synonyms a single characteristic drawing of that shell . . . On the contrary it is the *S. mutabilis* (Seba Mus. vol. iii, pl. 60, f. 28 etc.) and the *S. plicatus* (Rumph. pl. 37, f. T. etc.), the former of which is marked for this species in the Linnaean cabinet, where the supposititious *urceus* is not present, to which our attention is directed by the references."

As I am treating *S. plicatus* Lamarck as one of the forms of the *urceus* of authors, and as it will be shown that Hanley was in error as to the identity of *mutabilis* Swainson with *urceus* Linné, the only helpful part of his comment is his conviction that the post-Linnaean authors were not describing Linnaeus' *urceus*. One reason given by him for this opinion was that "the striking color of the aperture in *urceus* was not mentioned in the description" (*loc. cit.*). This undoubtedly refers to the black lip and columella already discussed. Thus my strong impression is that Hanley meant, by the expression "the *urceus* of authors," the black-lipped form. The two most recent iconographies of the Strombidae in Hanley's day were the second edition of the "Conchylien Cabinet" (1845, vol. 4) and Reeve's "Conchologica iconica" (1851, vol. 6), both of which mention the black aperture as a specific determinant of *urceus* Linné. Likewise the best of Sowerby's figures in the "Thesaurus conchiliorum" shows this form. It seems reason-

able to suppose that Hanley utilized these works.

Watson (1886, p. 417) followed Hanley in holding that the *urceus* of authors was not the *urceus* of Linnaeus and also perpetuated what I feel was Hanley's error in believing that *S. floridus* Lamarck (*S. mutabilis* Swainson) was the Linnaean type. In looking for a valid name for the *urceus* of authors he chooses the earliest post-Linnaean name, *Canarium muricatum* Martini, 1777, adding that after Martini the next in line of priority would be *Strombus ustulatus* (*Canarium ustulatum*) Schumacher, 1817. As the Martini names have been officially rejected as not being consistently binomial, the first valid name is that of Schumacher. As will appear, I disagree with Watson's identification of *S. urceus* Linné with *S. floridus* Lamarck.

Tryon's description of *urceus* Linné (*op. cit.*, p. 118) recalls the smooth form of the *urceus* of authors for which I propose the name: form *laevis*. As to the color of the aperture he says (*loc. cit.*), "lip, aperture and columella deep orange-brown, or chestnut, or more usually deep chocolate or black," showing that he was impressed by the "Schwartzmündige" form as being rather typical than otherwise. He makes the species synonymous with *S. ustulatus* Schumacher, 1817, *S. incisus* Wood, 1828, and *S. anatellus* Duclos (*in* Chenu), 1844. His figures (pl. 6, figs. 65-67) show two smooth forms and one apparently with no plications but with strong nodes at the shoulder; two with a strongly plicated spire and one with the spire virtually smooth. Tryon makes no suggestion that there is any difference between the *urceus* of authors and the species that Linnaeus described.

C. Hedley (1904, p. 188) also appears to agree with Hanley that *urceus* Linné was *S. floridus* Lamarck (*S. mutabilis* Swainson) and adds (*loc. cit.*) "the *urceus* of authors is *S. ustulatus* Schumacher 1817."

W. Adam and E. Leloup (1938, pp. 112-116) believed that the *urceus* of authors was identical with *S. plicatus* Lamarck for which they gave an exhaustive synonymy including *S. dentatus* Gmelin, 1791. They were unwilling, however, to pass definitely

upon the identity of Linnaeus' *urceus*, but do disagree with Hanley, Watson, and Hedley, saying (*op. cit.*, p. 115): "As to the interpretation of *Strombus urceus* Linné we do not agree that it is identical with *S. floridus* Lamarck" (translation).

This is the state in which the problem of the identity of *urceus* Linné is left today. Hanley, Watson, and Hedley believe that he was describing *S. floridus* Lamarck. Certainly if that shell is present in the Linnaean cabinet, as Hanley reported, and marked for *urceus*, that fact is weighty but not conclusive evidence. In any event it would be useful to check Hanley's statement by an examination of the collection *de novo* as soon as that becomes possible. Linnaeus' description of *urceus*, however, omits many of the most characteristic features of *floridus*. Hanley uses Linnaeus' omission of any reference to "the striking color of the aperture" as evidence that he was not describing the *urceus* of authors. Might it not also be said that the omission of a reference to the rosy pink color of the aperture of *floridus* was evidence that he was not describing that shell? In fact the description of *urceus*, although broad enough to cover many forms in this general group, is woefully inapplicable to *floridus*, and I will always contend that Linnaeus' descriptions, short though they may be, are entitled to more weight than the figures he cites or the presence or absence of marked specimens in his collection. In addition to the failure to mention the pink color of the aperture there is no hint of the characteristic shoulder at the upper end of the lip. There is no mention of the folds across the entire length of the columella. Most significant of all, the words "ventre spiraque plicato-nodosus" in the description of *urceus* are utterly inapt as applied to *floridus*.

In the last analysis the only evidence in favor of *floridus* as the representative of *urceus* Linné is the fact that a specimen of *floridus* was said to have been found in Linnaeus' collection. This may well have been a mistake of Linnaeus himself or of

someone following him to whom the custody of his cabinet was entrusted. A reading of the Introduction to Hanley's work (*supra*) should convince one that not only the vicissitudes which the collection has suffered but Linnaeus' own inaccuracies as well leave much room for charges of error of this sort. I must therefore conclude that *urceus* Linné is not *floridus* Lamarck. It is not the black-lipped form of the *urceus* of authors as that form also has a smooth or almost smooth body-whorl. It may have been a shell something like *plicatus* Lamarck. But on the state of the evidence I am content to consider it among the "lost" species of Linnaeus.

In summary I suggest:

1. That *S. urceus* of authors not Linné, *S. dentatus* of authors not Linné, *S. plicatus* Lamarck, and the other names cited as synonyms of *urceus* and *dentatus* Linné by Tryon are all forms of a variable species which should receive the name *Strombus ustulatus* Schumacher, 1817, at least while awaiting further study. I here propose for the extremely smooth form of *ustulatus* the name "form *laevis*," and for the plicate form, the name "form *plicatus*."

2. That *S. urceus* Linné be rejected as an undetermined species.

3. That *S. tridentatus* Gmelin, 1791, *S. tridentatus* Lamarck, 1822, and *S. samarensis* Reeve, 1851, are all synonyms of a well-defined species with extremely constant characteristics which should retain the first name of *S. dentatus* Linné. It is unfortunate that the well-established name *tridentatus* should have to be abandoned in favor of the less graphically descriptive *dentatus*, particularly in view of the confusion of that name with certain forms of the *urceus* of authors. (It is conceivable that the International Commission on Zoological Nomenclature might hold that Linnaeus' brief and somewhat unenlightening description of *dentatus* and his failure to provide any synonymy or locality would preclude the retention of the Linnaean name, in which case the species would become *S. tridentatus* Gmelin, 1791.)

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